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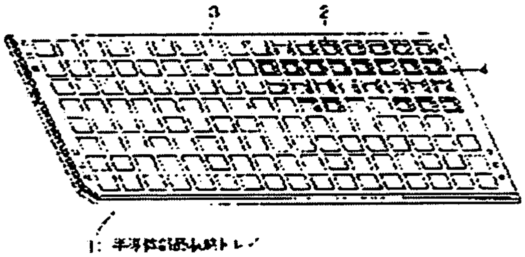
(54) SEMICONDUCTOR PART STORAGE TRAY AND ITS REUSE DISCRIMINATION METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a semiconductor part storage tray whether the tray can be reused or not is accurately judged.

SOLUTION: A plurality of pockets 3 for storing semiconductor parts 2 are provided vertically and horizontally on the tray 1. Strength deterioration measuring sections 4 for measuring the deterioration of strength of the tray 1 are provided in the vicinity of both ends in the longitudinal direction of the tray 1. A breaking strength value required for breaking the vicinity of the center of the strength deterioration measuring sections 4 is measured by a breaking instrument, and when the breaking strength value is larger than the reference strength value, the strength deterioration of the tray 1 is judged to be slight. As the frequency of reuse of the tray 1 is measured based on the number of holes in the strength deterioration measuring sections 4, the frequency of reuse of the tray 1 can be increased as many as possible within the range of not generating troubles of the carriage of semiconductor parts 2. A part of the semiconductor part storage tray is scooped out into the U-shape to form a stretching and contracting member and a warping member, and whether the tray can be reused or not is judged based on the stretching and contracting amount of the stretching and contracting member and the warping amount of the warping member.



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CLAIMS

[Claim(s)]
[Claim 1] In the semi-conductor components receipt tray on which two or more pockets which can contain semi-conductor components were formed The measurement result of the fracture force taken to have two or more on-the-strength degradation test sections for measuring degradation of said semi-conductor components receipt tray on the strength, and to open a hole in said on-the-strength degradation measurement circles, The semi-conductor components receipt tray on which reinforcement of whether said semi-conductor components receipt tray holds predetermined reinforcement and utilization time is characterized by judging whether it has predetermined reinforcement based on the measurement count of the fracture force.
[Claim 2] Each of two or more of said on-the-strength degradation test sections is a semi-conductor components receipt tray according to claim 1 characterized by carrying out ********** formation of the top face of said semi-conductor components receipt tray partially.
[Claim 3] Said two or more on-the-strength degradation test sections are prepared along with two sides which said semi-conductor components receipt tray counters. Between said two sides Said on-the-strength degradation test section by the side of one side, The semi-conductor components receipt tray according to claim 1 or 2 which makes a pair said on-the-strength degradation test section by the side of the other sides, and is characterized by judging whether said semi-conductor components receipt tray is reusable based on the result of having measured the fracture force, by each on-the-strength degradation test section which became a pair.
[Claim 4] The semi-conductor components receipt tray characterized by for having had the flexible member by which ********** formation is carried out in some of said semi-conductor components receipt trays horseshoe-shaped, and the shrinkage test section which measures the amount of contractions of said flexible member in the semi-conductor components receipt tray on which two or more pockets which can contain semi-conductor components were formed, and having been measured by said contraction test section to judge whether is shrunken and reuses said semi-conductor components receipt tray based on an amount.
[Claim 5] The semi-conductor components receipt tray characterized by judging whether it can have the curvature member by which ********** formation is carried out in said some of semi-conductor components receipt trays horseshoe-shaped in the semi-conductor components receipt tray on which two or more pockets which can contain semi-conductor components were formed, and said semi-conductor components receipt tray can be reused according to the amount of camber of said curvature member.
[Claim 6] The reuse distinction approach of the semi-conductor components receipt tray characterized by to judge that said semi-conductor components receipt tray is reusable based on the measurement result of the fracture force which took to open a hole in two or more on-the-strength degradation measurement circles for measuring degradation of said semi-conductor components receipt tray on the strength in the reuse distinction approach of a semi-conductor components receipt tray that two or more pockets which can contain semi-conductor components were formed, and the measurement count of the fracture force.
[Claim 7] The reuse distinction approach of the semi-conductor components receipt tray characterized by to judge whether said semi-conductor components receipt tray can reuse some of said semi-conductor components receipt trays based on either [at least] the amount of contractions

of the flexible member by which ********** formation is carried out, or the amount of camber in the reuse distinction approach of a semi-conductor components receipt tray that two or more pockets which can contain semi-conductor components were formed, to horseshoe-shaped.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the technique which reuses a semi-conductor components receipt tray especially (reuse) about the approach of distinguishing the basic reinforcement / curvature specification of a semi-conductor components receipt tray that two or more pockets which can contain semi-conductor components were formed.
[0002]
[Description of the Prior Art] The semi-conductor components 2 manufactured by the semi-conductor plant are usually contained by the tray 1 as shown in drawing 12 , and are sent to a customer. Two or more pockets 3 for containing the semi-conductor components 2 are formed in the tray 1, and if the semi-conductor components 2 are contained by each pocket 3, baking processing will be carried out at the temperature of every tray 100-150 degrees C. The moisture in each pocket 3 is removed by this baking processing. After baking processing finishes, as the tray 1 whole is put into the bag of aluminum, and is sealed and moisture does not enter into each pocket 3, conveyance to a user is performed.
[0003] The tray 1 is made from PPE (polyethylene ether terephthalate) etc., and, recently, the tray 1 has been reused more often for the purposes, such as environmental preservation, (reuse).
[0004]
[Problem(s) to be Solved by the Invention] However, whenever it performs baking processing, a configuration changes somewhat, and on the whole, a tray 1 will usually be contracted, if baking processing is performed. Moreover, a tray 1 has a possibility that reinforcement may deteriorate by the baking condition / baking time amount. For this reason, he measures the count of reuse of a tray 1 conventionally, and was trying to reuse a tray 1 within limits to which the count of reuse does not exceed the count of predetermined.
[0005] Although the technique of putting a scribing line into a tray 1 at every reuse, and being able to view the count of reuse as the technique of measuring the count of reuse of a tray 1 can be considered, there is a possibility of spoiling an appearance-fine sight, by the width of face of a scribing line, or dispersion of die length.
[0006] Moreover, when size of a scribing line is made small so that a fine sight may not be spoiled, there is also a possibility of being hard coming to check a scribing line and overlooking it.
[0007] Furthermore, although reinforcement-degradation became large, there was no technique of one tray which got a certain impact while carrying and collecting which measures extent of reinforcement-degradation of a tray 1 with a simply and sufficient precision conventionally.
[0008] This invention is made in view of such a point, and the purpose has the basic reinforcement / curvature of a semi-conductor components receipt tray in offering a specification passage, the semi-conductor components receipt tray which can judge exactly whether a semi-conductor components receipt tray is reusable again, and its reuse distinction approach.
[0009]
[Means for Solving the Problem] In order to solve the technical problem mentioned above, invention of claim 1 In the semi-conductor components receipt tray on which two or more pockets which can contain semi-conductor components were formed The measurement result of the fracture force taken to have two or more on-the-strength degradation test sections for measuring degradation of said

semi-conductor components receipt tray on the strength, and to open a hole in said on-the-strength degradation measurement circles, Based on the measurement count of the fracture force, the reinforcement of whether said semi-conductor components receipt tray holds predetermined reinforcement and utilization time judges whether it has predetermined reinforcement.

[0010] In invention of claim 1, since it judges whether a tray is reused or not based on the measurement result of the fracture force and the measurement count of the fracture force which were taken to open a hole in the on-the-strength degradation test section on a tray, a tray can break in the defect accident of a tray, for example, semi-conductor conveyance, or the accident of being unable to contain semi-conductor components in a pocket according to deformation of a tray can be prevented beforehand.

[0011] In invention of claim 2, in order to form a ********** on-the-strength degradation test section for two or more places of the top face of a semi-conductor components receipt tray, in case a hole is opened in an on-the-strength degradation test section, the force with a tray impossible for will stop adding, and a tray will not deform.

[0012] In invention of claim 3, since the fracture force is measured by two or more [on a tray] in case degradation on the strength is measured, average degradation of a tray on the strength can be measured with a sufficient precision.

[0013] Invention of claim 4 is equipped with the flexible member by which ********** formation is carried out in some of said semi-conductor components receipt trays horseshoe-shaped, and the shrinkage test section which measures the amount of contractions of said flexible member, and judges [by which it was measured by said contraction test section] whether it is shrunken and said semi-conductor components receipt tray fulfills specification based on the amount in the semi-conductor components receipt tray on which two or more pockets which can contain semi-conductor components were formed.

[0014] In invention of claim 4, since a ********** flexible member is formed in horseshoe-shaped for some semi-conductor components receipt trays, with the amount of telescopic motion of a flexible member, it can judge that a tray is less than specification, and can judge simply and correctly whether it is reusable.

[0015] Invention of claim 5 is equipped with the curvature member by which ********** formation is carried out in said some of semi-conductor components receipt trays horseshoe-shaped in the semi-conductor components receipt tray on which two or more pockets which can contain semi-conductor components were formed, and judges whether according to the amount of camber of said curvature member, said semi-conductor components receipt tray is reusable.

[0016] In invention of claim 5, it can judge simply and correctly whether since a ********** curvature member is formed in horseshoe-shaped, a tray can reuse some semi-conductor components receipt trays with the amount of curvatures of a curvature member.

[0017]

[Embodiment of the Invention] Hereafter, the semi-conductor components receipt tray concerning this invention is explained concretely, referring to a drawing.

[0018] Drawing 1 is the perspective view of the 1st operation gestalt of the semi-conductor components receipt tray concerning this invention. Two or more pockets 3 for containing the semi-conductor components 2 are arranged in all directions by the tray 1 of drawing 1 .

[0019] The on-the-strength degradation test section 4 for measuring degradation of a tray 1 on the strength is formed near the both ends of the longitudinal direction of a tray 1.

[0020] Drawing 2 is the perspective view to which the expansion plan of the 1st operation gestalt and drawing 3 expanded the A-A line sectional view of drawing 2 , and drawing 4 expanded the on-the-strength degradation test-section 4 neighborhood. The on-the-strength degradation test section 4 has ********** structure partially in the top face of a tray 1, as shown in drawing 4 . In case degradation of a tray 1 on the strength is measured, the fracture machine 5 as shown in drawing 3 is pushed against the circular part 40 of the center of the on-the-strength degradation test section 4, and the fracture force required to fracture the circular part 40 is measured with the fracture vessel 5.

[0021] The top view of the on-the-strength degradation test section 4 before drawing 5 (a) fractures the circular part 40 of the on-the-strength degradation test section 4, and drawing 5 (b) are the top views of the on-the-strength degradation test section 4 after fracturing the circular part 40.

[0022] The fracture machine 5 measures the fracture force required to fracture the circular part 40 of drawing 5 , i.e., a breaking strength value. The breaking strength value measured with the fracture vessel 5 is compared with the criteria value on the strength defined beforehand, and if a breaking strength value is larger than a criteria value on the strength, it will be judged that there is little degradation of a tray 1 on the strength. On the contrary, if a breaking strength value is below a criteria value on the strength, it will be judged that degradation of a tray 1 on the strength is intense, and reuse (reuse) of a tray 1 will be stopped.
[0023] In addition, the configuration of the on-the-strength degradation test section 4 may not be limited to drawing 5 , for example, drawing 6 and drawing 7 are sufficient as it. If the circular part of drawing 6 (a) is fractured, it will become a configuration like drawing 6 (b), and similarly, if the circular part of drawing 7 (a) is fractured, it will become a configuration like drawing 7 (b). Moreover, the fracture section may not be restricted circularly but a rectangle and an anomaly are sufficient as it.
[0024] Drawing 8 (a) is drawing showing the condition of having fractured the on-the-strength degradation test section 4 of the left end on a tray 1. When measuring degradation on the strength to the degree of drawing 8 (a), the 2nd on-the-strength degradation test section 4 is fractured from the left of illustration.
[0025] The reinforcement of a tray 1 is not necessarily uniform, since reinforcement may deteriorate remarkably partially, forms the on-the-strength degradation test section [like drawing 5 - drawing 7] 4 of a tray 1 whose two or more places are, and may measure a breaking strength value at the time of one on-the-strength degradation measurement, taking the measurement result in two or more on-the-strength degradation test sections 4 into consideration. For example, in case drawing 8 (b) arranges the on-the-strength degradation test section 4 over two or more trains and performs on-the-strength degradation measurement along with the list of a pocket 3, it is missing from an inside train from an outside train, and shows the example which measures the fracture force for every train.
[0026] Thus, if a breaking strength value is measured by two or more places of a tray 1 at the time of one on-the-strength degradation measurement, the average breaking strength of a tray 1 can be measured with a sufficient precision.
[0027] Moreover, the count of reuse of a tray 1 can be grasped by measuring the number of the holes which were able to be opened in the tray 1. For example, since a total of 12 holes are open in the case of drawing 8 (b) supposing it opens four holes per time, the count of reuse is judged to be 3 times.
[0028] Thus, the breaking strength value according to (1) fracture machine 5 at this operation gestalt is larger than a criteria value on the strength. And only when the count of reuse of the tray 1 measured by the number of the holes of the (2) tray 1 is under a count of criteria (for example, 5 times), in order to reuse a tray 1, The defect accident (for example, accident which a tray 1 breaks during conveyance of semi-conductor components, or a tray 1 deforms, and, and damages the semi-conductor components contained in the pocket 3) of a tray 1 can be prevented beforehand.
[accident] [that it becomes impossible to contain semi-conductor components in the pocket 3]
[0029] Moreover, if the number of the holes of the on-the-strength degradation test section 4 is counted, since the count which performed on-the-strength degradation measurement can be grasped easily, it can judge quickly whether a tray 1 is reusable.
[0030] Moreover, since the size and the number of semi-conductor components which can be contained differ from each other, if the count of criteria is beforehand appointed for every tray according to the class of tray, the optimal count of reuse can be set up for every tray.
[0031] (2nd operation gestalt) As mentioned above, after receipt of semi-conductor components finishes, baking processing of the semi-conductor components receipt tray 1 is carried out at the temperature which is 100-150 degrees C. However, when there is a problem that the configuration of a tray 1 will deform and contract if baking processing is performed to the semi-conductor components receipt tray 1 and baking processing is repeated, a possibility that it may become impossible to contain the semi-conductor components 2 is in a pocket 3.
[0032] For this reason, the 2nd operation gestalt is characterized by enabling it to measure simply how many semi-conductor components receipt trays 1 deformed.
[0033] Drawing 9 is the expansion plan of the 2nd operation gestalt of the semi-conductor

components receipt tray 1 by this invention, and shows near the rim section of a tray 1. tray 1 top face of drawing 9 -- the shape of a typeface of KO -- ****** -- him -- the ****** measurement field 11 is formed. The contraction member 12 from which the end was fixed to the tray 1 and the other end turned into an open end, and the graduation section 13 which measures the die length of the contraction member 12 are formed in the contraction measurement field 11.

[0034] If baking processing is performed to a tray 1, since the contraction member 12 will contract, the die length of the contraction member 12 is measured in the graduation section 13, if it becomes shorter than the criteria die length defined beforehand, it will judge that the amount of contraction is large, and reuse of a tray 1 will be stopped.

[0035] In addition, two or more contraction measurement fields 11 like drawing 9 may be established in the top face and side face of a tray 1. For example, if the contraction measurement field 11 is established in the four corners of a tray 1, the average amount of contraction of a tray 1 can be measured.

[0036] Thus, with the 2nd operation gestalt, since the contraction member 12 of a configuration like drawing 9 is formed in a tray 1, it can measure how many trays 1 contracted with a simply and sufficient precision, and can judge exactly whether a tray 1 is reusable based on the measurement result.

[0037] (3rd operation gestalt) Although the 2nd operation gestalt showed the example which measures telescopic motion by baking processing, the 3rd operation gestalt measures the curvature of the tray 1 by baking processing.

[0038] The plan of the 3rd operation gestalt of the semi-conductor components receipt tray 1 according [drawing 10] to this invention and drawing 11 are the A-A line sectional views of drawing 10 . The curvature measurement field 14 for measuring the curvature of a tray 1 is established in the top face or side face of a tray 1 of drawing 10 . Like the 2nd operation gestalt (drawing 9), the curvature measurement field 14 has ********** structure to horseshoe-shaped in some trays 1, and has the curvature member 15 from which the end was fixed to the tray 1 and the other end turned into an open end.

[0039] If baking processing is performed to a tray 1, as the dotted line of drawing 11 shows, the curvature member 15 will become so large that a top or the bottom has many counts of baking processing as for curvature and this curvature. For this reason, for example, when the curvature member 15 curves above the alternate long and short dash line of drawing, or in the bottom, it judges that curvature is large and reuse of a tray 1 is stopped.

[0040] In addition, if two or more curvature measurement fields 14 like drawing 10 may be established in the top face and side face of a tray 1 and the measurement result of two or more curvature measurement fields 14 is synthetically taken into consideration, they can measure the average amount of curvatures of a tray 1.

[0041] Thus, with the 3rd operation gestalt, since the curvature member 15 of a configuration like drawing 10 is formed in a tray 1, it can measure how many trays 1 curved with a simply and sufficient precision, and can judge exactly whether a tray 1 is reusable based on the measurement result.

[0042] the 1- mentioned above -- the 3rd operation gestalt may be carried out independently, respectively, or may be combined with arbitration and may be carried out. For example, since the contraction member 12 of drawing 9 and the curvature member 15 of drawing 1010 have the almost the same configuration, they may measure contraction and the curvature of a tray 1 to coincidence.

[0043]

[Effect of the Invention] According to this invention, as explained to the detail above, two or more on-the-strength degradation test sections are prepared in a semi-conductor components receipt tray, and since it judged whether a tray would be reused or not based on the measurement result of the fracture force and the measurement count of the fracture force which were taken to open a hole in these on-the-strength degradation test section, the count of reuse of a tray can be increased as much as possible in the range which trouble does not produce in conveyance of semi-conductor components.

[0044] Moreover, according to this invention, a ********** flexible member and a curvature member are formed in horseshoe-shaped for some semi-conductor components receipt trays, and since it judged whether a tray would be reused or not based on the amount of telescopic motion of a flexible member, or the amount of curvatures of a curvature member, it can judge exactly whether a tray is reusable.

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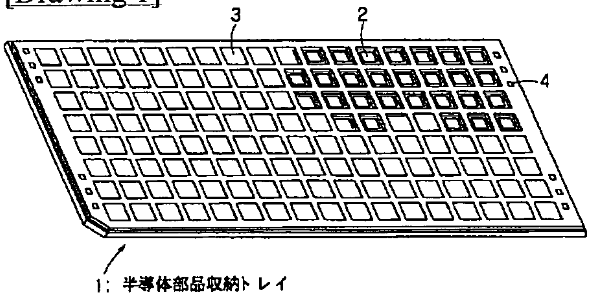
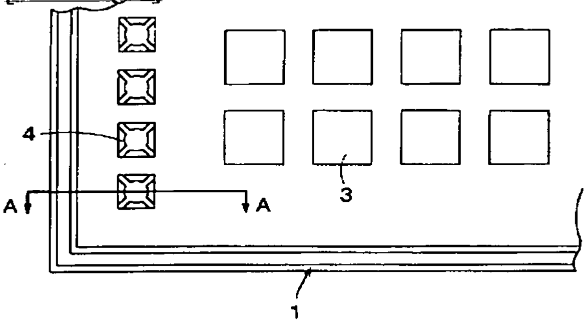
DRAWINGS

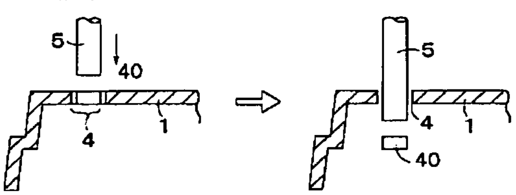
[Drawing 1]



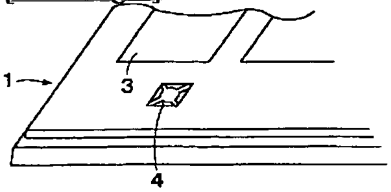
[Drawing 2]



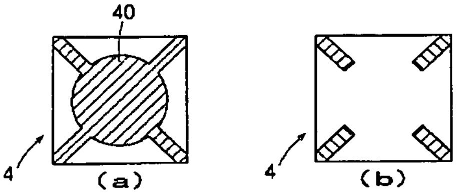
[Drawing 3]



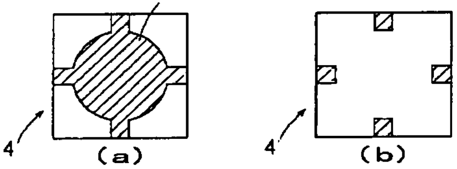
[Drawing 4]



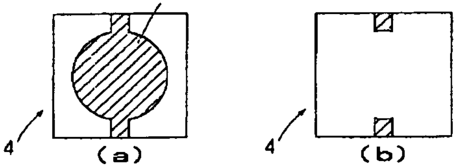
[Drawing 5]



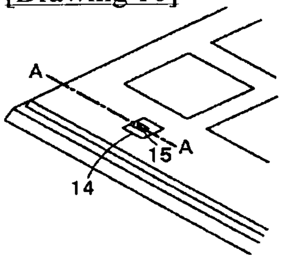
[Drawing 6]



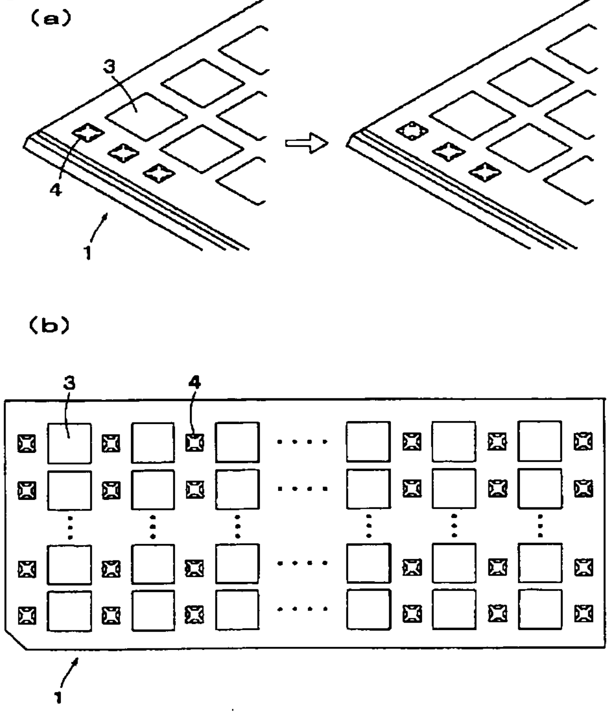
[Drawing 7]



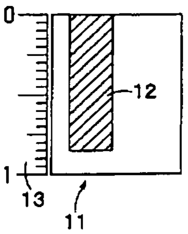
[Drawing 10]

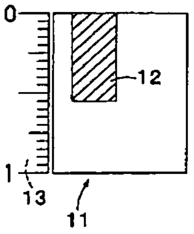


[Drawing 8]

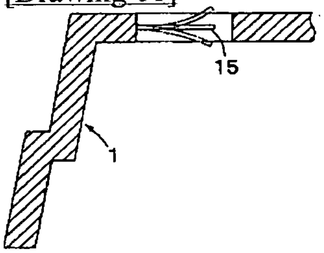


[Drawing 9]





[Drawing 11]



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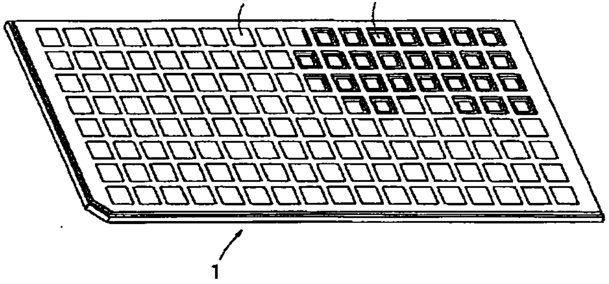

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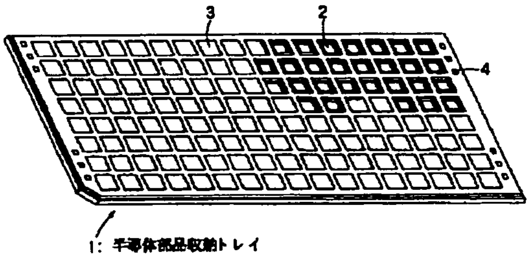
DC01 EA02X EA02Y FA16
GA01
5F031 CA13 DA05

(54)【発明の名称】 半導体部品収納トレイおよびその再利用判別方法

(57)【要約】

【課題】 半導体部品収納トレイが再利用可能か否かを的確に判断することができる半導体部品収納トレイを提供する。

【解決手段】 トレイ１には、半導体部品２を収納するための複数のポケット３が縦横に配設されている。トレイ１の長手方向の両端部付近には、トレイ１の強度劣化を測定するための強度劣化測定部４が設けられる。強度劣化測定部４の中央付近を破断するのに要する破断強度値を破断器にて測定し、破断強度値が基準強度値よりも大きければ、トレイ１の強度劣化は少ないと判断する。また、強度劣化測定部４内の孔の数により、トレイ１の再利用回数を計測するため、半導体部品２の運搬に支障が生じない範囲内で、トレイ１の再利用回数を可能な限り増やせる。また、半導体部品収納トレイの一部をコの字状にくり抜いて伸縮部材や反り部材を形成し、伸縮部材の伸縮量や反り部材の反り量によりトレイの再利用の可否を判断する。



【特許請求の範囲】

【請求項１】半導体部品を収納可能な複数のポケットが形成された半導体部品収納トレイにおいて、

前記半導体部品収納トレイの強度劣化を測定するための複数の強度劣化測定部を備え、

前記強度劣化測定部内に孔を開けるのに要した破断力の測定結果と、破断力の測定回数とに基づいて、前記半導体部品収納トレイが所定の強度を保有しているか否か、あるいは利用時の強度が所定の強度を有するか否かを判断することを特徴とする半導体部品収納トレイ。

【請求項２】前記複数の強度劣化測定部のそれぞれは、前記半導体部品収納トレイの上面を部分的にくり抜いて形成されることを特徴とする請求項１に記載の半導体部品収納トレイ。

【請求項３】前記複数の強度劣化測定部は、前記半導体部品収納トレイの対向する２辺に沿って設けられ、

前記２辺のうち１辺側の前記強度劣化測定部と、他辺側の前記強度劣化測定部とを対にして、対になった各強度劣化測定部で破断力を測定した結果に基づいて前記半導体部品収納トレイが再利用可能か否かを判断することを特徴とする請求項１または２に記載の半導体部品収納トレイ。

【請求項４】半導体部品を収納可能な複数のポケットが形成された半導体部品収納トレイにおいて、

前記半導体部品収納トレイの一部をコの字状にくり抜いて形成される伸縮部材と、

前記伸縮部材の縮み量を測定する縮み測定部と、を備え、

前記縮み測定部で測定された縮み量に基づいて前記半導体部品収納トレイを再利用するか否かを判断することを特徴とする半導体部品収納トレイ。

【請求項５】半導体部品を収納可能な複数のポケットが形成された半導体部品収納トレイにおいて、

前記半導体部品収納トレイの一部をコの字状にくり抜いて形成される反り部材を備え、

前記反り部材のそり量に応じて、前記半導体部品収納トレイが再利用可能か否かを判断することを特徴とする半導体部品収納トレイ。

【請求項６】半導体部品を収納可能な複数のポケットが形成された半導体部品収納トレイの再利用判別方法において、

前記半導体部品収納トレイの強度劣化を測定するための複数の強度劣化測定部内に孔を開けるのに要した破断力の測定結果と、破断力の測定回数とに基づいて、前記半導体部品収納トレイが再利用可能か否かを判断することを特徴とする半導体部品収納トレイの再利用判別方法。

【請求項７】半導体部品を収納可能な複数のポケットが形成された半導体部品収納トレイの再利用判別方法において、

前記半導体部品収納トレイの一部をコの字状にくり抜いて形成される伸縮部材の縮み量およびそり量の少なくとも一方に基づいて、前記半導体部品収納トレイが再利用可能か否かを判断することを特徴とする半導体部品収納トレイの再利用判別方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、半導体部品を収納可能な複数のポケットが形成された半導体部品収納トレイの基礎強度／反り規格を判別する方法に関し、特に、半導体部品収納トレイを再利用（リユース）する技術に関する。

【０００２】

【従来の技術】半導体製造工場で製造された半導体部品２は、通常、図１２に示すようなトレイ１に収納されて顧客に届けられる。トレイ１には、半導体部品２を収納するための複数のポケット３が設けられており、各ポケット３に半導体部品２が収納されると、トレイ１ごと、１００～１５０℃の温度でベーキング処理される。このベーキング処理により、各ポケット３内の湿気が除去される。ベーキング処理が終わると、トレイ１全体をアルミニウムの袋に入れて密封し、各ポケット３に湿気が入り込まないようにして客先への運搬を行う。

【０００３】トレイ１は、ＰＰＥ（ポリエチレン・エーテル・テレフタレート）等を材料としており、最近では、環境保全等の目的のため、トレイ１を再利用（リユース）することが多くなってきた。

【０００４】

【発明が解決しようとする課題】しかしながら、トレイ１は、ベーキング処理を行うたびに、形状が多少変化し、通常は、ベーキング処理を行うと全体的に収縮してしまう。また、トレイ１は、ベーキング条件／ベーキング時間により強度が劣化するおそれがある。このため、従来は、トレイ１の再利用回数を計測して、再利用回数が所定回数を越えない範囲内でトレイ１を再利用するようにしていた。

【０００５】トレイ１の再利用回数を計測する手法として、再利用のたびにトレイ１にケガキ線を入れて、再利用回数を目視できるような手法が考えられるが、ケガキ線の幅や長さのばらつきにより、外観的な美観を損なうおそれがある。

【０００６】また、美観を損なわないように、ケガキ線のサイズを小さくすると、ケガキ線を確認しづらくなり、見落とすおそれもある。

【０００７】さらに、運搬および回収する間に何らかの衝撃を受けたトレイ１は、強度的な劣化が大きくなるが、従来は、トレイ１の強度的な劣化の程度を簡易かつ精度よく測定する手法はなかった。

【０００８】本発明は、このような点に鑑みてなされたものであり、その目的は、半導体部品収納トレイの基礎強度／反りが規格通りか、また、半導体部品収納トレイ

が再利用可能か否かを的確に判断することができる半導体部品収納トレイおよびその再利用判別方法を提供することにある。

【０００９】

【課題を解決するための手段】上述した課題を解決するために、請求項１の発明は、半導体部品を収納可能な複数のポケットが形成された半導体部品収納トレイにおいて、前記半導体部品収納トレイの強度劣化を測定するための複数の強度劣化測定部を備え、前記強度劣化測定部内に孔を開けるのに要した破断力の測定結果と、破断力の測定回数とに基づいて、前記半導体部品収納トレイが所定の強度を保有しているか否か、あるいは利用時の強度が所定の強度を有するか否かを判断する。

【００１０】請求項１の発明では、トレイ上の強度劣化測定部に孔を開けるのに要した破断力の測定結果と破断力の測定回数とに基づいて、トレイを再利用するか否かを判断するため、トレイの不良事故、例えば、半導体運搬中にトレイが壊れたり、トレイの変形により半導体部品をポケットに収納できない等の事故を未然に防止できる。

【００１１】請求項２の発明では、半導体部品収納トレイの上面の複数箇所をくり抜いて強度劣化測定部を形成するため、強度劣化測定部に孔を開ける際に、トレイに無理な力が加わらなくなり、トレイが変形しなくなる。

【００１２】請求項３の発明では、強度劣化を測定する際に、トレイ上の複数箇所で破断力を測定するため、トレイの平均的な強度劣化を精度よく測定することができる。

【００１３】請求項４の発明は、半導体部品を収納可能な複数のポケットが形成された半導体部品収納トレイにおいて、前記半導体部品収納トレイの一部をコの字状にくり抜いて形成される伸縮部材と、前記伸縮部材の縮み量を測定する縮み測定部と、を備え、前記縮み測定部で測定された縮み量に基づいて前記半導体部品収納トレイが規格を満たしているか否かを判断する。

【００１４】請求項４の発明では、半導体部品収納トレイの一部をコの字状にくり抜いて伸縮部材を形成するため、伸縮部材の伸縮量により、トレイが規格以内であることを判断し、また再利用可能か否かを簡易かつ正確に判断することができる。

【００１５】請求項５の発明は、半導体部品を収納可能な複数のポケットが形成された半導体部品収納トレイにおいて、前記半導体部品収納トレイの一部をコの字状にくり抜いて形成される反り部材を備え、前記反り部材のそり量に応じて、前記半導体部品収納トレイが再利用可能か否かを判断する。

【００１６】請求項５の発明では、半導体部品収納トレイの一部をコの字状にくり抜いて反り部材を形成するため、反り部材の反り量により、トレイが再利用可能か否かを簡易かつ正確に判断することができる。

【００１７】

【発明の実施の形態】以下、本発明に係る半導体部品収納トレイについて、図面を参照しながら具体的に説明する。

【００１８】図１は本発明に係る半導体部品収納トレイの第１の実施形態の斜視図である。図１のトレイ１には、半導体部品２を収納するための複数のポケット３が縦横に配設されている。

【００１９】トレイ１の長手方向の両端部付近には、トレイ１の強度劣化を測定するための強度劣化測定部４が設けられている。

【００２０】図２は第１の実施形態の拡大上面図、図３は図２のＡ－Ａ線断面図、図４は強度劣化測定部４付近を拡大した斜視図である。強度劣化測定部４は、図４に示すように、トレイ１の上面を部分的にくり抜いた構造になっている。トレイ１の強度劣化を測定する際には、強度劣化測定部４の中央の円形部分４０に、図３に示すような破断器５を押しつけて、円形部分４０を破断するのに必要な破断力を破断器５にて測定する。

【００２１】図５（ａ）は強度劣化測定部４の円形部分４０を破断する前の強度劣化測定部４の平面図、図５（ｂ）は円形部分４０を破断した後の強度劣化測定部４の平面図である。

【００２２】破断器５は、図５の円形部分４０を破断するのに必要な破断力、すなわち破断強度値を測定する。破断器５により測定された破断強度値は、予め定めた基準強度値と比較され、破断強度値が基準強度値よりも大きければ、トレイ１の強度劣化は少ないと判断される。逆に、破断強度値が基準強度値以下であれば、トレイ１の強度劣化が激しいと判断され、トレイ１の再利用（リユース）が中止される。

【００２３】なお、強度劣化測定部４の形状は、図５に限定されず、例えば、図６や図７でもよい。図６（ａ）の円形部分を破断すると図６（ｂ）のような形状になり、同様に、図７（ａ）の円形部分を破断すると図７（ｂ）のような形状になる。また、破断部は、円形に限らず、方形・異形でもよい。

【００２４】図８（ａ）はトレイ１上の左端の強度劣化測定部４を破断した状態を示す図である。図８（ａ）の次に強度劣化の測定を行う場合は、図示の左から２番目の強度劣化測定部４を破断する。

【００２５】トレイ１の強度は必ずしも一様ではなく、部分的に強度が著しく劣化する場合がありうるため、トレイ１の複数箇所に図５～図７のような強度劣化測定部４を設けておき、一回の強度劣化測定時に、複数の強度劣化測定部４での測定結果を考慮に入れて破断強度値を測定してもよい。例えば、図８（ｂ）は、ポケット３の並びに沿って、複数列にわたって強度劣化測定部４を配置し、強度劣化測定を行う際は、外側の列から内側の列にかけて、列ごとに破断力を測定する例を示している。

【００２６】このように、一回の強度劣化測定時にトレイ１の複数箇所で破断強度値を測定すれば、トレイ１の平均的な破断強度を精度よく測定することができる。

【００２７】また、トレイ１に開けられた孔の数を計測することにより、トレイ１の再利用回数を把握することができる。例えば、一回あたり４つの孔を開けるとすると、図８（ｂ）の場合、計１２個の孔が開いているため、再利用回数は３回と判断される。

【００２８】このように、本実施形態では、（１）破断器５による破断強度値が基準強度値より大きく、かつ、（２）トレイ１の孔の数により計測されるトレイ１の再利用回数が基準回数（例えば、５回）未満である場合のみ、トレイ１の再利用を行うため、トレイ１の不良事故（例えば、半導体部品の運搬中にトレイ１が壊れたり、トレイ１が変形してそのポケット３に半導体部品を収納できなくなったり、ポケット３に収納した半導体部品を損傷したりする事故）を未然に防止することができる。

【００２９】また、強度劣化測定部４の孔の数を数えれば、強度劣化測定を行った回数を容易に把握できるため、トレイ１が再利用可能か否かを迅速に判断することができる。

【００３０】また、トレイの種類により、収納可能な半導体部品のサイズや数が異なるため、トレイごとに予め基準回数を定めておけば、トレイごとに最適な再利用回数を設定することができる。

【００３１】（第２の実施形態）上述したように、半導体部品収納トレイ１は、半導体部品の収納が終わった後、１００～１５０℃の温度でベーキング処理される。ところが、半導体部品収納トレイ１に対してベーキング処理を行うと、トレイ１の形状が変形して収縮するという問題があり、ベーキング処理を繰り返すと、ポケット３内に半導体部品２を収納できなくなるおそれがある。

【００３２】このため、第２の実施形態は、半導体部品収納トレイ１がどの程度変形したかを簡易に測定できるようにしたことを特徴とする。

【００３３】図９は本発明による半導体部品収納トレイ１の第２の実施形態の拡大上面図であり、トレイ１の外縁部付近を示している。図９のトレイ１上面には、コの字形状にくり抜かれた収縮測定領域１１が設けられている。収縮測定領域１１には、一端がトレイ１に固定され他端が開放端になった収縮部材１２と、収縮部材１２の長さを測定する目盛り部１３とが設けられている。

【００３４】トレイ１に対してベーキング処理を行うと、収縮部材１２が収縮するため、収縮部材１２の長さを目盛り部１３で測定し、予め定めた基準長さよりも短くなると、収縮量が大きいと判断して、トレイ１の再利用を中止する。

【００３５】なお、図９のような収縮測定領域１１は、トレイ１の上面や側面に複数個設けてもよい。例えば、トレイ１の四隅に収縮測定領域１１を設ければ、トレイ１の平均的な収縮量を測定することができる。

【００３６】このように、第２の実施形態では、トレイ１に図９のような形状の収縮部材１２を設けるため、トレイ１がどの程度収縮したかを簡易かつ精度よく測定することができ、その測定結果に基づいて、トレイ１が再利用可能か否かを的確に判断することができる。

【００３７】（第３の実施形態）第２の実施形態は、ベーキング処理による伸縮を測定する例を示したが、第３の実施形態は、ベーキング処理によるトレイ１の反りを測定するものである。

【００３８】図１０は本発明による半導体部品収納トレイ１の第３の実施形態の上面図、図１１は図１０のＡ－Ａ線断面図である。図１０のトレイ１の上面または側面には、トレイ１の反りを測定するための反り測定領域１４が設けられている。反り測定領域１４は、第２の実施形態（図９）と同様に、トレイ１の一部をコの字状にくり抜いた構造になっており、一端がトレイ１に固定され他端が開放端になった反り部材１５を有する。

【００３９】トレイ１に対してベーキング処理を行うと、図１１の点線で示すように、反り部材１５が上側または下側に反り、この反りはベーキング処理の回数が多いほど大きくなる。このため、例えば、反り部材１５が図の一点鎖線よりも上、あるいは下に反った場合には、反りが大きいと判断してトレイ１の再利用を中止する。

【００４０】なお、図１０のような反り測定領域１４は、トレイ１の上面や側面に複数個設けてもよく、複数個の反り測定領域１４の測定結果を総合的に考慮すれば、トレイ１の平均的な反り量を測定することができる。

【００４１】このように、第３の実施形態では、トレイ１に図１０のような形状の反り部材１５を設けるため、トレイ１がどの程度反ったかを簡易かつ精度よく測定することができ、その測定結果に基づいて、トレイ１が再利用可能か否かを的確に判断することができる。

【００４２】上述した第１～第３の実施形態は、それぞれ単独で実施してもよいし、あるいは、任意に組み合わせて実施してもよい。例えば、図９の収縮部材１２と図１０の反り部材１５は形状がほぼ同じであるため、トレイ１の収縮と反りとを同時に測定してもよい。

【００４３】

【発明の効果】以上詳細に説明したように、本発明によれば、半導体部品収納トレイに複数の強度劣化測定部を設け、これら強度劣化測定部に孔を開けるのに要した破断力の測定結果と破断力の測定回数とに基づいて、トレイを再利用するか否かを判断するようにしたため、半導体部品の運搬に支障が生じない範囲で、トレイの再利用回数を可能な限り増やすことができる。

【００４４】また、本発明によれば、半導体部品収納トレイの一部をコの字状にくり抜いて伸縮部材や反り部材を形成し、伸縮部材の伸縮量、または反り部材の反り量

に基づいて、トレイを再利用するか否かを判断するようにしたため、トレイが再利用可能か否かを的確に判断することができる。

【図面の簡単な説明】

【図１】本発明に係る半導体部品収納トレイの第１の実施形態の斜視図。

【図２】第１の実施形態の拡大上面図。

【図３】図２のＡ－Ａ線断面図。

【図４】強度劣化測定部付近を拡大した斜視図。

【図５】（ａ）は強度劣化測定部の円形部分を破断する前の強度劣化測定部の平面図、（ｂ）は円形部分を破断した後の強度劣化測定部の平面図。

【図６】強度劣化測定部の変形例を示す図。

【図７】強度劣化測定部の他の変形例を示す図。

【図８】（ａ）はトレイ上の左端の強度劣化測定部を破断した状態を示す図、（ｂ）は列ごとに破断力を測定する例を示す図。

【図９】本発明による半導体部品収納トレイの第２の実施形態の拡大上面図。

【図１０】本発明による半導体部品収納トレイの第３の実施形態の上面図。

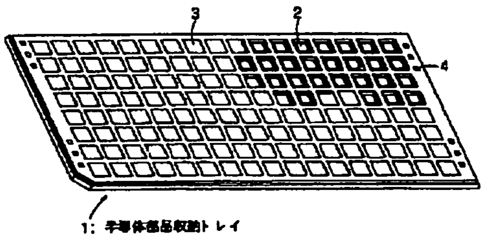
【図１１】図１０のＡ－Ａ線断面図。

【図１２】従来の半導体部品収納トレイの斜視図。

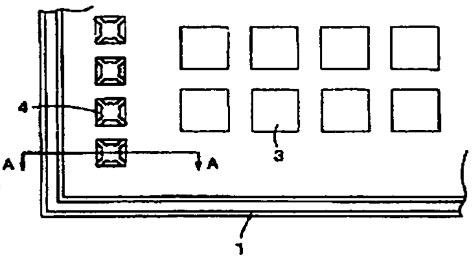
【符号の説明】

１	半導体部品収納トレイ
２	半導体部品
３	ポケット
４	強度劣化測定部
５	破断器
１１	収縮測定領域
１２	収縮部材
１３	目盛り部
１４	反り測定領域
１５	反り部材
４０	円形部分

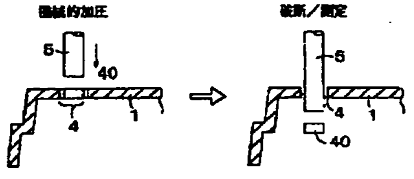
【図１】



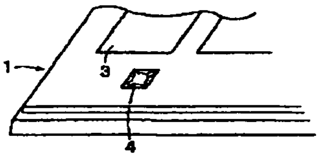
【図２】



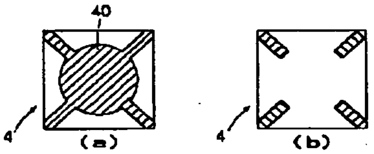
【図３】



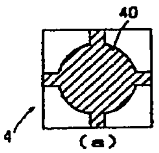
【図４】

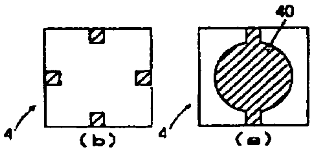


【図５】

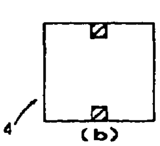


【図６】

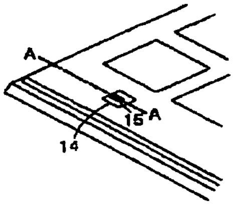




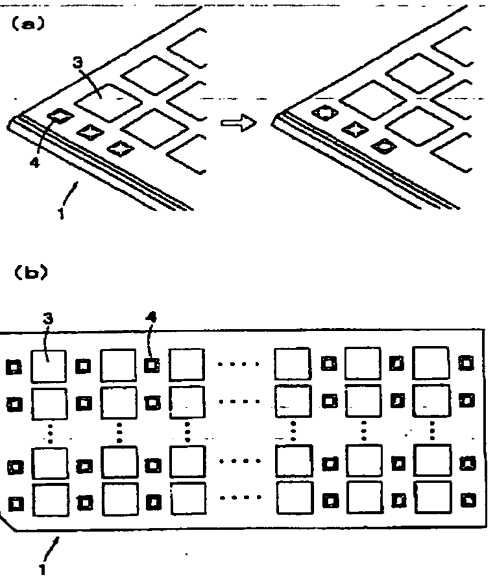
【図７】



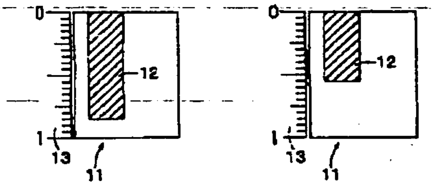
【図１０】



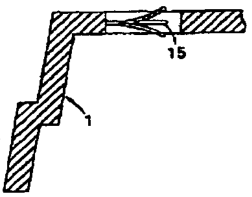
【図８】



【図９】



【図１１】



【図１２】